Uganda

Estimation of Commodity Requirements for 2002–2003

Drugs to Treat Malaria

Prepared for the Ministry of Health, Uganda

Jim Eberle
Yasmin Chandani

September 2002

Uganda Ministry of Health

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DELIVER

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Abstract

Details the results of the April 2002 assessment, when the Ministry of Health (MOH) only had on order or was stocking enough pharmaceuticals to treat malaria patients for three months, until July 2002. The MOH did not plan to purchase additional anti-malarial drugs. To prevent a current and future stockout, the MOH was advised to (1) develop a logistics management information system, (2) assess the impact of introducing sulphadoxine pyrimethamine and choloroquine in eight districts, (3) ensure that all MOH clinics knew about the new standard treatment guideline, and (4) consider streamlining the ordering process for drugs.

Uganda Ministry of Health

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Contents

Acronyms

ACP	AIDS control program
AIC	AIDS Information Centre
AIDS	acquired immune deficiency syndrome
AIM	USAID-funded district based AIDS project
CDC/GAP	Centers for Disease Control and Prevention/Global AIDS Program
CQ	choloroquine
DANIDA	Danish International Development Agency
DFID	British Department for International Development
DOTS	directly observed treatment short-course
ED	essential drugs
EDP	essential drug program
EGPAF	Elizabeth Glaser Paediatric AIDS Foundation
EU	European Union
GFATM	Global Fund for AIDS, TB and malaria
GLRA	German Leprosy Relief Association
GOU	Government of Uganda
GTZ	*Deutsche Gesellschaft fur Technische Zusammenarbeit* (German international development agency)
HC	health center
HIV	human immunodeficiency virus
HIV/AIDS	see HIV and AIDS
HSSP	DANIDA-funded Health Sector Support Project
IPT	intermittent presumptive treatment
JMS	joint medical stores
JSI	John Snow, Inc.
KfW	German funding agency for international development
MAP	Multi Country AIDS Program
MOH	Ministry of Health
MOS	months of stock
MTCT	mother-to-child transmission
NBTU	Nakasero blood transfusion unit
NGO	nongovernmental organization
NMS	National Medical Stores
NORAD	North American Aerospace Defense Command
OI	opportunistic infection
PHC	primary health care
PHC-CG	primary health care conditional grants
PMTCT and PPTCT	preventing MTCT or PTCT
PSI	Population Services International
SDP	service delivery point
SLA	senior logistics advisor (FPLM)
SOH	stock on hand
SP	sulphadoxine pyrimethamine
STI	sexually transmitted infection
SWAp	Sector Wide Approach
TASO	The AIDS Support Organization
TB	tuberculosis

UAC	Uganda AIDS Commission
UNAIDS	United Nations Programme on HIV/AIDS
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VCT	voluntary counseling and testing (HIV)
WHO	World Health Organization (Geneva, Switzerland)

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The views stated in this report are those of the authors, and do not necessarily reflect the views of the U.S. Agency for International Development or the Uganda Ministry of Health.

Executive Summary

At the time of this assessment (April 2002), the Ministry of Health (MOH) had on order or was stocking only enough pharmaceuticals to meet malaria patient requirements for three months (until July 2002). Furthermore, the MOH did not plan for additional anti-malarial drugs to be purchased under the Multi Country AIDS Program (MAP) project.

The issue of an impending stockout was discussed at the joint meeting of MOH and donors in April, and DFID and Irish AID both agreed to step in and fill the gap by purchasing a one-year supply each of sulphadoxine-pyrimethamine (SP) and quinine, worth $1.2 miion. As an emergency measure, a two-month supply of SP was bought locally and distributed in July and August. Another four-month supply of SP is being air-shipped in, while the remaining six-month supply of SP will come in through a regular sea shipment. Unfortunately, the long registration process for double-scored packs of quinine has resulted in a delay in purchasing and bringing in stop-gap quinine supplies.

The aforementioned problems illustrate the need to identify possible funding sources for 2003, and approach each source as soon as possible to secure a supply of needed anti-malaria ls for the foreseeable future. In this regard, the MOH should perform quantification exercises regularly and provide the results to all potential donors.

In addition, the MOH should—

- Expedite the development and maintenance of a logistics management information system to ensure that accurate stock balances, and issues and receipts are recorded at all warehouses and service delivery points and that this information is routinely transmitted to a central database where it can be processed.

- Assess the impact of the introduction of the full course of SP and choloroquine to treat malaria in eight districts on the MOH and nongovernemental organizations (NGO) systems and future quantifications. It is currently assumed that impact will be minimal because of the inadequate budget.

- Ensure that all MOH (especially NGO) clinics are aware of new standard treatment guidelines (calling for the use of SP and chloroquine as first-line treatment, quinine tablets for second-line treatment, and quinine injection for complicated cases).

- Consider streamlining the process used by health centers to order anti-malarial drugs from districts. for example, one possibility is to have districts collect and consolidate orders from health centers and make one purchase. This may be most cost effective and is already in use within the system in some places. Alternatively, explore the inclusion of anti-malarial drugs and financing mechanism in the MOH/Pharmacy and push-pull transition, which helps districts quantify their own needs.

Background

The Government of Uganda (GOU) estimates that the antenatal human immunodeficiency virus (HIV) prevalence is 6.1 percent, and approximately 1.1 million people with HIV/acquired immune deficiency syndrome (HIV/AIDS) are living in the country. Growing government commitment and nongovernmental organizations (NGOs) involvement, coupled with strong support from international donor organizations, has contributed to both a reduction in prevalence and an increase in HIV/AIDS knowledge and program development. However, there is a need to greatly expand the range and quality of prevention, and the care and support interventions to continue the progress.

The availability of HIV/AIDS, tuberculosis (TB), and malaria-related commodities will be central to the effort to expand the range and quality of services being offered. To ensure the consistent and reliable availability of these commodities to customers, programs must, in the medium term to long-term—

- Be able to quantify their commodity needs.
- Have or mobilize resources to ensure procurement of these commodities.
- Have or access skills to procure these commodities.
- Deliver the commodities reliably to all customers along the supply chain.

Recognizing this, the GOU/Ministry of Health (MOH) asked the DELIVER/Uganda project to assist in coordinating the quantification of the range of commodities required by HIV/AIDS, TB, and malaria programs. This and other companion quantifications will provide a detailed justification for all HIV/AIDS, TB, and malaria program commodity requirements across both the public and civil society sectors for 2002 and 2003. Currently, there are several funding sources that are and can be used to procure commodities for HIV/AIDS programs, including the MOH budget, the World Bank-supported Multi Country AIDS Program (MAP), funds from the Global Funds for AIDS, Tuberculosis and Malaria (GFATM), and resources from donors and foundations. Without a systematic attempt to quantify commodities for all HIV/AIDS, TB, and malaria programs and a coordination of procurement and ordering, however, there is a great risk of less than optimal use of resources through duplicate and incorrect orders.

Many commodities included under the umbrella of HIV/AIDS are already on the essential drugs list, which are used specifically by HIV/AIDS program components (e.g., sexually transmitted infection [STI], TB, and opportunistic infection [OI] drugs), as well as other purposes. This document will focus on malaria program logistics and commodities while referencing other public health commodities, where appropriate, given GOU's long-term goal to integrate supply and logistics systems for health programs.

Key stakeholders involved in implementing HIV/AIDS prevention and treatment programs include the Uganda AIDS Commission (UAC), the Ministry of Health AIDS Control Program (MOH/ACP), and the Uganda Blood Transfusion Unit; NGOs, including the AIDS Information Center (AIC) and The AIDS Support Organization (TASO); and other cooperating agencies, such as the Centers for Disease Control and Prevention (CDC) and USAID-funded district based AIDS project (AIM) Uganda.

Overview: Commodity Financing in the Public Sector

In general, financing for commodities used in public sector facilities combines MOH and donor funds. Donors can contribute in two ways: (1) through Sector Wide Approach (SWAp) funding via budget support to the Ministry of Finance; or (2) through provision of in-kind contributions, such as direct supplies of commodities to specific programs. To date, there has been no central mechanism or section of the MOH that keeps track of all the various donor inputs, in terms of commodity supplies. However, DELIVER/Uganda is currently working with the pharmacy section to establish a commodity tracking database that will maintain records of all donor commodity inputs.

Following is an approximate summary of funding sources, by program, for commodities in the public sector in Uganda. The focus is on commodity inputs for lower-level health units (HC II, III, and IV), not district, regional, and referral hospitals.

1. Essential Drugs

Health units currently obtain essential drugs and supplies in the following ways:

- *Pre-packed essential drug program (EDP) kits, which are procured centrally and distributed to all public sector health facilities on a quarterly basis*. Funding for the 30–40 essential drugs included in the kit came from the GOU and the Danish International Development Agency (DANIDA), through its DANIDA-funded Health Sector Support Project (HSSP). The content of the kits has recently been updated to more accurately reflect health facility needs. The supply of drugs in the kit is generally insufficient for health unit needs' and only lasts 1–1.5 months.

- *Direct purchases by the district or health units using funds from the primary health care conditional grants.* In theory, after the funds have been released, 50 percent are available for drug purchases to supplement supplies in the kit. In practice, delays in the release of funds and reporting requirements on use of the funds have led to limited use of primary health care conditional grants (PHC-CG) for purchasing drugs.

Even if the full amount allocated for drugs from the PHC-CG grants were released regularly, funding is still not sufficient for drug needs at the lower levels. A recent study conducted by MOH/pharmacy section and HSSP demonstrated that districts require approximately U.S.$2.40 per capita to provide sufficient commodities for the minimum package of services that GOU has committed to providing for Ugandians. Currently, including all GOU and partner direct and in-kind contributions, only about U.S.$0.96 per capita is being spent on commodities.

- To address the issue of irregular and insufficient supplies, the pharmacy section is planning a phased transition to a comprehensive order-based system for essential health commodities. The transition to the new *pull* system will begin in January 2003. Key elements of the new system include—

    - To instill the idea of a *value* for the kit among lower level health units. DANIDA/GOU funding for essential drugs will be a budget line equal to the value of the imported kit.

- During the transitional period, health units can use the budget line to purchase locally assembled kits until they have sufficient capacity to estimate their requirements and place orders for individual items.
- Eventually, comprehensive orders will be placed using funds from both the essential drugs (ED) budget line and the PHC-CG budget, and each health unit will have a separate account at National Medical Stores/joint medical stores (NMS/JMS).
- Donated products for vertical programs will be added to the order form for the pull system to encourage systematic orders to be placed by each health facility for all its commodity needs.

2. Sexually Transmitted Infection and Opportunistic Infection Drugs

Funding for these supplies has been erratic in the last several years. Initially, the World Bank STI project (1995–2000) supplied condoms for STI/HIV prevention, drugs for STI syndromic management, TB treatment according to directly observed treatment short-course (DOTS), and OI treatment. Other donors for these commodities during the same period included British Department for International Development (DFID) and *Kreditanstalt fur Wiederaufbau* (KfW). These commodities were provided to MOH, NGO, and mission sites. After the project funding ran out in 2000, a small amount of MOH funds were allocated to purchase STI drugs. This money was never used for STI drug purchases but reallocated for purchasing EDP kits.

Consequently, since the end of 2000, there has been no consistent provision of STI drugs to lower levels through the national program, because the EDP kits purchased do not contain all the drugs required for syndromic management of STIs. In theory, districts should have been able to obtain these drugs by ordering from the NMS using their PHC-CG drug budgets. In practice, release of the PHC grants has not been timely and districts have had difficulties accessing funds after their release. Thus, it is likely that health centers have had inconsistent supplies and shortages of STI drugs. Although TB and malaria drugs were also affected by the shortages in funding, the programs have been better able to mobilize other donor resources to ensure provision of supplies.

Between April–July 2002, most of an emergency shipment, valued at U.S.$1.3 million, of drugs for STI, TB, OI, and HIV test kits, syphilis test kits, and expendable medical supplies arrived, procured through the World Bank-assisted MAP project. Through standard non-emergency procedures, the project has also procured substantial amounts of HIV/AIDS commodities, which will be supplied through the Uganda AIDS Commission and the MOH, starting in early 2003. Although estimates were made of commodities required for treating STIs, TB, malaria, and specialized OIs, this was a budget-driven exercise rather than a systematic quantification of needs for both public and civil society sectors based on demand and a realistic assessment of Uganda's capacity to deliver services and supplies.

3. Malaria Drugs

The main funding source for anti-malarial drugs is the government via budget support to the treasury from donor agencies. This money (the conditional PHC grant) is, in turn, supplied to the district health departments. After district health departments are informed of their allotment, they are required to spend 50 percent of the amount on drugs, part of which is spent on anti-malarials. Districts and health units also receive anti-malarial drugs in the pre-packed EDP kit.

In times of crisis, donor agencies have been known to purchase anti-malarial drugs directly on behalf of the government, and supply them to the MOH for distribution. WHO provided this support during a malaria epidemic in the late 1990s. On the whole, however, there is no coordinated approach to donor support of the malaria program.

As of July, with the change in policy of chloroquine (CQ) and sulphadoxine-pyrimethamine (SP) as first-line treatment, the MOH did not plan for additional anti-malarial drugs to be purchased under the MAP project. This has resulted in low stock levels of both first-line and second-line treatment drugs, especially SP. The issue of an impending stockout was discussed at the joint meeting of MOH and donors in April, and DFID and Irish AID both agreed to step in and fill the gap by purchasing a one-year supply each of SP and quinine, worth $1.2 million. As an emergency measure, a two-month supply of SP was bought locally and distributed in July and August. Another four-month supply is being air-shipped in, while the remaining six–month supply will come in through a regular sea shipment. Unfortunately, the long registration process for double-scored packs of quinine has resulted in a delay in purchasing and bringing in stop-gap quinine supplies.

4. Tuberculosis Drugs

There have been two main sources of funding for TB drugs in recent years: the MOH and the German Leprosy Relief Association (GLRA). The primary source during the later 1990s was the MOH. Between 1995 and 2000, funds from the World Bank STI Project were used to supply TB drugs. GLRA also supplied TB drugs between 1995 and 2000, especially during lapses in the MOH procurement process.

More recently (2001), the TB program has been relying on a World Bank Debt Relief Facility and GLRA to supply its TB drugs. Although the TB program expects this to change in the near future through the World Bank MAP project supplies, orders of a one-year supply of drugs through that mechanism have been delayed due to the lengthy registration process for manufacturers for the TB 4 and TB 2 blister packs.

Similarly, suppliers from the Global Drug Facility of the STOP TB fund are unable to step in and cover the potential shortage in TB drugs because products from their manufacturing site are also not registered in Uganda, and the long registration process is hindering quick action in this area.

The TB program applied for funds through the GFATM, but, to date, they have not received an award of funds through this mechanism.

A detailed outline of the organizational structure, management, and functioning of the TB program and a quantification for TB drugs can be found in a companion report on TB drugs.

5. HIV Test Kits

In the past, HIV rapid test kits for VCT and PMCT were funded by a variety of sources, including CDC/GAP, DFID, the NORAD/UNFPA, Voluntary Counseling and Testing (VCT) Project, UNICEF, and USAID. Funding for these services and supplies is currently provided under the following sources: Elizabeth Glaser Paediatric AIDS Foundation (EGPAF), European Union (EU), Irish AID, UNICEF, USAID, and the MAP project. for the National Blood Safety program, the Nakasero Blood Transfusion Unit (NBTU) receives 40 percent of its operating budget from the EU, and these funds are used to procure HIV ELISA test kits for testing donated blood, hepatitis B test kits, and syphilis test kits. The remaining 60 percent of its funding is through budgetary allocations from the MOH, and this money is also used to procure supplies, such as blood bags, reagents, etc. NBTU recently received support from DFID for an emergency shipment of a three-month

supply of blood bags to prevent a national stockout. The certainty of continued EU funding for the program is not assured, and it is important that the unit's supply needs are quantified with the other test kit requirements.

The MOH/ACP will receive some HIV test kits through the World Bank MAP project described earlier. In addition, Uganda recently submitted a Country Proposal to the GFATM, and was awarded $53 million in August 2002. Approximately 40 percent of the total funding submission will be used for commodity purchase, but detailed quantification of HIV test kits and other supplies is needed before final commodity purchase and detailed procurement plans can be made.

A companion report summarizes the initial quantification of STI drug needs for the public and civil society sectors in Uganda for 2002–2004. This companion report and all the information contained therein, represents the first time a needs-based quantification has been conducted for these sectors in Uganda. Given the dearth of hard data on past consumption of STI drugs, and incidence and prevalence rates of STIs, the quantification process relied heavily on the expertise and knowledge of key stakeholders, especially at the STI/ACP program within the MOH.

Because of the scarcity of hard data, the quantification is based on a series of generally liberal assumptions related to staff training in the revised syndromic management algorithm, prevalence rates, and overlap of drug use for STIs and other purposes. If some of these positive assumptions are not met, the proportional quantities of STI drugs might have to be adjusted. Another important point to keep in mind is that, given alternative uses of these same drugs for other health problems, tracking the accuracy of the forecast will be difficult.

Assumptions for Quantification of Drugs for Malaria Treatment

1. Background

MOH central and district level health department officials estimate that more than 50 percent of patients seeking treatment at public health facilities are diagnosed with malaria. These officials report that nearly all cases of high fever are treated with anti-malarial drugs. This fact alone emphasizes the importance of having a supply of anti-malarial drugs in the MOH service delivery system.

Until recently, the first-line treatment regimen for malaria was CQ. In April 2002, the entire treatment regimen was altered because resistance to CQ in Uganda had risen to 30 percent. The new treatment regimen calls for a combination of CQ and SP to be used as first-line treatment. Quinine tablets are used as a second-line treatment, and complicated cases are now treated with quinine injection.

Further efforts are underway by donors to address childhood malaria. WHO has recently initiated a project to make the first-line treatment package available through community-based distributors for children aged five years and younger. The drugs will be packaged as a set that can be purchased over the counter. The project is being piloted in eight districts, but is expected to be implemented in 21 districts within one year. The package is being sold for 300 Ugandian shillings. Some people think this price is too high compared to the price of purchase from bulk supplies.

In addition to the WHO project, there are plans to introduce intermittent presumptive treatment (IPT) for pregnant mothers. All pregnant women will receive IPT or two doses of SP: one in the second trimester and one in the third trimester. IPT will constitute part of the antenatal care package delivered at both health units and through MCH community-based structures. The appropriateness of SP of IPT will be closely monitored and modified as the need arises. The program and its partners will continue to explore the most appropriate approaches to delivering IPT. Implementation of this strategy will be steered by MCP but coordinated by the Division of Reproductive Health.

2. Assumptions

1. for the purposes of this quantification, several different types of projections on yearly needs were conducted for each drug (SP tablets, CQ tablets, quinine tablets, quinine ampoules for injection). One projection was a morbidity-based projection; a second was based on consumption data for 2002; a third was based on the average consumption data for 2000 and 2002; and, in the case of SP, a fourth projection was based on an adjusted average of 2000/2002 consumption data.

2. In the case of each anti-malarial drug, the morbidity-based projection was discarded, because it was thought to produce estimates that were well beyond actual need. This model assumed that all malaria attacks were treated and that 38 percent of those suffering an attack visited an MOH or NGO clinic for service. The assumption that all people suffering from malaria seek treatment was thought to be erroneous. Because data could not be found on the actual number who do seek treatment, it was not possible to accurately estimate this figure. In addition, the estimate that 38 percent of those who seek treatment visit an MOH or NGO clinic is also thought to be erronous. This figure was provided in the quantification prepared in the “2000 Background Paper for the National Consensus Meeting to Review

Anti-Malarial Drug Policy in Uganda" without reference to source. Therefore, because consumption data was available, a consumption-based projection or modified consumption-based projection was used to project need for all four anti-malarial drugs.

3. Because the MOH and donors were only interested in procuring amounts for the MOH and NGO delivery systems, and because only sales/issues data from the central stores of MOH and the NGOs was readily available, this sales/issues data was used to project the yearly need.

4. Because sales/issues data were available for both 2000 and 2002, and because the figures for the two years sometimes deviated significantly, an average of the two was used to estimate the yearly need for each anti-malarial drug.

5. The MOH Malaria Control Program announced a change in treatment policy on April 25 that was formally launched on June 17. for this quantification, it was assumed that the new first-line treatment using CQ and SP will take effect immediately.

6. Since the 2000 and 2002 sales/issues figures for SP reflected the use of this drug in only 30 percent of cases, it was necessary to adjust the average of these sales figures to reflect 100 percent usage of SP (in accordance with the new first-line treatment regime). Sales/isues figures for other malaria drugs did not require any adjustment upwards because the treatment regimen had not changed.

7. Quantities to order include the quantity required to reach 12 months of stock, assuming a two-month lead time (i.e. two months worth of existing stock will be consumed prior to arrival of new orders). The two-month lead time was used because it is currently expected that these amounts will be sent by air-freight. It is assumed that additional procurements will be made so a three-month buffer is maintained and future quantifications will take this into consideration.

8. Estimates of annual consumption include amounts required for IPT during pregnancy.

9. Quantities to order assume that the effects of the new WHO (HOMAPAK) effort to sell packaged treatment for childhood malaria will have minimal impact on the number of children who will access MOH and NGO facilities seeking treatment for malaria.

Quantification for Malaria Treatment

1. Sulphadoxine-Pyrimethamine (SP) Tablets

Sulphadoxine-pyrimethamine (SP) tablets, with chloroquine (CQ), are used as a first-line treatment for malaria.

1.1 Estimates of Annual Consumption of SP Tablets: MOH and NGO Systems

Three estimates of the annual consumption/sales of SP tablets (500 mg/25 mg) in the MOH and NGO system were developed and compared.

1.1.1 Morbidity-based projection for sulphadoxine-pyrimethamine tablets (adjusted from 2000 document)

This estimate is based on the methodology used by consultants in 2000 to estimate drug needs for the various anti-malarial drugs. The only adjustment made to this methodology was to assume that the new first-line treatment would go into effect immediately (meaning that SP would be provided in 100 percent of all attacks). The methodology assumes the following:

- The new first-line treatment using CQ and SP will take effect immediately in the program.
- The average prevalence of symptomatic malaria attacks for an adult 15 years and above is estimated to be two per year, and each attack is treated with three tablets of SP.
- The average prevalence of symptomatic malaria attacks for a child between five and 15 years is estimated to be four per year, and each attack is treated with two tablets of SP.
- The average incidence of symptomatic malaria attacks for a child under five is estimated at six per year, and each attack is treated with .5 tablets of SP.
- Year 2000 population estimates still apply.
- Thirty-eight percent of all attacks are treated by the MOH and NGO sectors.
- Every symptomatic attack is treated.

Based on these assumptions the annual requirements are as follows:

1. *Children under five:*
   Number of children × number of attacks × treatment regime =
   4,201,028 × 6 × 0.5 = 12,603,084 tablets

2. *Children five to 15:*
   Number of children × number of attacks × treatment regime =
   6,299,178 × 4 × 2 = 50,393,424 tablets

3. *Adults:*
   Number of adults × number of attacks × treatment regime =
   11,709,794 × 2 × 3 = 70,258,764 tablets

   - Total for children and adults = 133,255,272 tablets
   - Thirty-eight percent of these cases treated by MOH/NGO = 50,637,003 tablets

Projected annual requirements using morbidity projection = 50,637,003 tablets.

1.1.2 Sales/issues-based projection for SP tablets (using recent sales/issues data)

Sales/issues data provided under this projection were collected from NMS and JMS for the year previous to April 2002. Only NMS and JMS sales were collected because it is assumed that MOH authorities are only concerned with SP supplied through these channels.

NMS Annual Sales:

- NMS sales consisted of sales of two-pack sizes of the same drug.
- Although there was a stockout of the one-pack size in July/August 2001, the assumption was that adjustments were not required because the other pack size was available during that period.
- Annual consumption was calculated by adding sales of both pack sizes.

Table 2: Sales/Issues by National Medical Stores 2001–2002

Pack Size	Time Period	Annual Sales/Issues
1,000 tablets/pack	January 2001–March 2002 (stocked out in July/August 2001)	3,525 packs × 1,000 tablets = 3,525,000 tablets. Annual total: 2,820,000 tablets
100 tablets/pack	January 2001–March 2002 (no stockout)	1,999 packs × 100 tablets =199,900 tablets. Annual total: 160,000 tablets
Total annual sales/issues by NMS = 2,980,000		

JMS Annual Sales:

- JMS sales consisted of sales of three-pack sizes of the same drug.
- Annual consumption was calculated by adding together sales of all three-pack sizes.

Table 3: Sales/Issues by Joint Medical Stores 2001–2002

Pack size	Time Period	Annual Sales/Issues
1,000 tablets/pack	April 2001–April 2002	4,400 packs × 1,000 tablets/pack = 4,400,000 tablets
100 tablets/pack	April 2001–April 2002	2,850 packs × 100 tablets/pack = 285,000 tablets
150 tablets/pack	April 2001–April 2002	21 packs × 150 tablets/pack = 3,150 tablets
Total annual sales/issues by JMS = 4,688,150		

Projected annual requirements using sales/issues for 2001–2002 = 7,668,000 tablets.

1.1.3 Adjusted sales/issues based projection for SP tablets (using 2000 and 2002 sales/issues data)

The following consumption/sales figures were reported for the public sector/NGO on page 72 in the "Background Paper for the National Consensus Meeting to Review Anti-Malarial Drug Policy in Uganda"[1] (hereafter referred to as the 2000 document):

- Combined annual 2000 sales/issues = 4,923,400 tablets.
- The average of 2000 and 2002 sales/issues = 6,295,000 tablets.

It is assumed that past sales/issues figures reflect the use of SP as a second-line treatment against malaria (based on past regimen). If we adjust these figures upward from 30 percent to 100 percent to reflect the usage of SP as a first-line treatment (as it will be from here forward), then the average sales/issues figures become:

6,295,000 tablets × .3 = 20,985,000 tablets.

Projected annual requirements using adjusted sales/issues for 2000/2002 = 20,985,000 tablets.

1.1.4 Comparison of projections for SP tablets

The 2000 and 2002 sales figures cannot be used by themselves to project future consumption because they do not reflect the expected increase in consumption that will occur when the SP is changed to a first-line treatment. The adjusted sales figures better reflect this expected increase in demand for SP. Likewise, the adjusted sales figures represent somewhat less than 50 percent of the morbidity projection, which is reasonable because fewer than 50 percent of atttacks are ever treated at public and NGO sites.

1.1.5 Final estimate of annual requirements of SP tablets

An additional 6 million tablets are expected to be consumed annually for IPT during pregnancy. Therefore, the final estimate of the annual requirements of SP is—

Final projected annual requirements of SP: 20,985,000 + 6,000,000 = 26,985,000 tablets.

[1] Ddumba, E., W. M. Were, and T. Y. Sukwa. June 2000. "Background Paper for the National Consensus Meeting to Review Anti-Malarial Drug Policy in Uganda." Kampala, Uganda.

1.2 Estimates of Stock Position of SP Tablets in April 2002: MOH and NGO Systems

Only the NMS and JMS stock positions were investigated.

Table 4: Stock on Hand and in Pipeline

Stock Position	NMS	JMS
Currently in Stock	195 packs × 1,000 tablets = 195,000 tablets	1,312 packs × 1,000 tablets =1,312,000 tablets
		635 packs × 100 tablets = 63,500 tablets
		465 packs × 150 tablets = 69,700 tablets
In Pipeline (expected 4/02)	3,000 packs × 1000 tablets = 3,000,000 tablets	2,600 packs × 1,000 tablets = 2,600,000 tablets
		400 packs × 100 tablets = 40,000 tablets
Total Stock (on hand and pipeline)	3,195,000	4,085,200

- Stock on hand and in pipeline of SP for MOH/NGO systems = 7,280,000 tablets.
- Assuming 26,985,000 tablets annual issues, then months of stock (MOS) in April 2002 = 3.2 MOS.

1.3 Requirements Estimation for SP Tablets: MOH and NGO Systems

If 26,985,000 tablets represent the annual consumption of SP (2,248,000 tablets per month), and we assume that the lead time for purchase is two months, then the stock on hand (MOS) at the time of the delivery for the new procurement will be 1.2 MOS. Therefore, to bring the overall stock level up to 12 months of stock, it is necessary to purchase 10.8 MOS.

The quantity to order to attain 12 MOS of SP = 10.8 MOS × 2,248,000 tablets per month = 24,280,000 tablets.

2. Chloroquine Tablets

2.1 Estimates of Annual Consumption of Chloroquine Tablets: MOH and NGO Systems

Three estimates of the annual consumption/sales of chloroquine tablets (150 mg) in the MOH and NGO systems were developed and compared.

2.1.1 Morbidity-based projection for chloroquine tablets (adjusted from 2000 document)

This estimate is based on the methodology used by consultants in 2000 to estimate drug needs for the various anti-malarial drugs. The only adjustment made to this methodology was to assume that the new first-line treatment would go into effect immediately (meaning that CQ and SP would be provided in 100 percent of all attacks).

The methodology assumes the following:

- That the new first-line treatment utilizing CQ and SP will take effect immediately in the program.
- On average, the prevalence of symptomatic malaria attacks for an adult 15 years and older is estimated to be two per year, and each attack is treated with 10 tablets of chloroquine.
- On average, the prevalence of symptomatic malaria attacks for a child between five and 15 years is estimated to be four per year, and each attack is treated with 7.5 tablets of chloroquine.
- On average, the prevalence of symptomatic malaria attacks for a child under age five is estimated to be six per year, and each attack is treated with 2.5 tablets of chloroquine.
- Year 2000 population estimates still apply.
- Thirty-eight percent of all attacks are treated by the MOH and NGO sectors.
- Every symptomatic attack is treated.

The requirements are as follows:

1. *Children under five:*
   Number of children × number of attacks × treatment regime =
   4,201,028 × 6 × 2.5 = 63,015,420 tablets

2. *Children five to 15:*
   Number of children × number of attacks × treatment regime =
   6,299,178 × 4 × 7.5 = 188,975,340 tablets

3. *Adults:*
   Number of adults × number of attacks × treatment regime =
   11,709,794 × 2 × 10 = 234,195,880 tablets

- Total for children and adults = 486,186,640 tablets.
- Thirty-eight percent of these cases treated by MOH/NGO = 184,750,000 tablets.

Projected annual requirements using morbidity projection = 184,750,000 tablets.

2.1.2 Sales/issues based projection for chloroquine tablets (using recent sales/issues data)

Sales/issues data provided under this projection were collected from NMS and JMS for the year previous to April 2002. Only NMS and JMS sales were collected because it is assumed that MOH authorities are only concerned with CQ tablets supplied through these channels.

NMS annual sales:

- NMS sales consisted of sales of one pack size of the same drug.

Table 5: Sales/Issues by National Medical Stores 2001–2002

Pack size	Time Period	Annual Sales/Issues
1,000 tablets/pack	January 2001–March 2002	31,974 packs × 1,000 tablets = 31,974,000 tablets Annual total: 25,579,000 tablets
Total annual sales/issues by NMS=25,579,000		

JMS Annual Sales:

- JMS sales consisted of sales of one pack size of the same drug.

Table 6: Sales/Issues by Joint Medical Stores 2001/2002

Pack size	Time Period	Annual Sales/Issues
1,000 tablets/pack	April 2001–April 2002	20,100 packs × 1,000 tablets/pack =
Total annual sales/issues by JMS=20,100,000		

Projected annual requirements using sales/issues for 2001/2002 = 45,679,000 tablets.

2.1.3 Adjusted sales/issues based projection for chloroquine tablets (using 2000 and 2002 sales/issues data)

The following consumption/sales figures were reported for the public sector/NGO on page 72 of the 2000 document:

- Combined annual 2000 sales/issues = 78,505,000 tablets.
- The average of 2000 and 2002 sales/issues = 62,092,000 tablets.

Projected annual requirements using adjusted sales/issues for 2000/2002 = 62,092,000 tablets.

2.1.4 Comparison of projections for chloroquine tablets

The 2000 and 2002 sales figures were averaged because there was a wide difference between the two. These adjusted sales figures better reflect this expected increase in demand for CQ tablets. Likewise, the adjusted sales figures represent less than 50 percent of the morbidity projection, which is reasonable, because, more than likely, 50 percent or fewer attacks are ever treated at public and NGO sites.

2.1.5 Final estimate of annual requirements of chloroquine tablets

The final estimate of the annual requirements of CQ is—

Final projected annual requirements of chloroquine = 62,092,000 tablets.

2.2 Estimates of Stock Position of Chloroquine Tablets in April 2002: MOH and NGO Systems

Only the NMS and JMS stock positions were investigated.

Table 7: Stock on Hand and in Pipeline

Stock Position	NMS	JMS
Currently in Stock	14,892 packs × 1,000 tablets = 14,892,000 tablets	2,806 packs × 1,000 tablets = 2,806,000 tablets
In the Pipeline		2,000 packs × 1,000 tablets = 2,000,000 tablets
Total Stock (on hand and pipeline)	14,892,000 tablets	4,806,000 tablets

- Stock on hand and in pipeline of CQ for MOH/NGO systems = 19,698,000 tablets.
- Assuming 62,092,000 tablets annual issues, then months of stock (MOS) in April 2002 = 3.7 MOS.

2.3 Requirements Estimation for Chloroquine Tablets: MOH and NGO Systems

If 62,092,000 tablets represents the annual consumption of CQ (5,174,000 tablets per month), and we assume that the lead time for purchase is two months, then the stock on hand at the time of the delivery for the new procurement will be 1.7 MOS. Therefore, to bring the overall stock level up to 12 months of stock, it is necessary to purchase 10.3 MOS.

The quantity to order to attain 12 MOS of chloroquine = 10.3 MOS × 5,174,000 tablets = 53,292,000 tablets.

3. Quinine Tablets

3.1 Estimates of Annual Consumption of Quinine Tablets: MOH and NGO Systems

Three estimates of the annual consumption/sales of quinine tablets (300 mg) in the MOH and NGO systems were developed and compared.

3.1.1 Morbidity-based projection for quinine tablets (adjusted from 2000 document)

This estimate is based on the methodology used by consultants in 2000 to estimate drug needs for the various anti-malarial drugs. The only adjustment made to this methodology was to assume that the new first-line and second-line treatment would go into effect immediately (meaning that quinine tablets would be provided in about 5 percent of all attacks when the first-line treatment fails). The methodology assumes the following:

- The new second-line treatment utilizing quinine will take effect immediately in the program.
- On average, the prevalence of symptomatic malaria attacks for an adult 15 years and older is estimated to be two per year, and 5 percent of these attacks are treated with 10 tablets of quinine tablets.
- On average, the prevalence of symptomatic malaria attacks for a child between five and 15 years is estimated to be four per year, and 5 percent of these attacks are treated with 7.5 tablets of quinine tablets.
- On average, the prevalence of symptomatic malaria attacks for a child under age five is estimated to be six per year, and 5 percent of these attacks are treated with 2.5 tablets of quinine tablets.
- That quinine will be administered in 5 percent of attacks after the first-line treatment fails.
- Year 2000 population estimates still apply.
- Thirty-eight percent of all attacks are treated by the MOH and NGO sectors.
- Every symptomatic attack is treated.

The requirements are as follows:

1. *Children under five:*
   Number of children × number of attacks × treatment regime =
   .05 × 4,201,028 × 6 × 10.5 = 13,233,000 tablets

2. *Children five to 15:*
   Number of children × number of attacks × treatment regime =
   .05 × 6,299,178 × 4 × 21 = 26,456,547 tablets

3. *Adults:*
   Number of adults × number of attacks × treatment regime =
   .05 × 11,709,794 × 2 × 42 = 49,181,134 tablets

- Total for children and adults = 88,870,681 tablets
- Thirty-eight percent of these cases treated by MOH/NGO = 33,770,000 tablets.

Projected annual requirements using morbidity projection = 33,770,000 tablets.

3.1.2 Sales/issues based projection for quinine tablets (using recent sales/issues data)

Sales/issues data provided under this projection were collected from NMS and JMS for the year previous to April 2002. Only NMS and JMS sales were collected because it is assumed that MOH authorities are only concerned with quinine tablets supplied through these channels.

NMS Annual Sales:

- NMS sales consisted of sales of one pack size of the same drug.

Table 8: Sales/Issues by National Medical Stores 2001–2002

Pack size	Time Period	Annual Sales/Issues
1,000 tablets/pack	January 2001–March 2002	2,811 packs × 1,000 tablets= 2,811,000 tablets Annual total: 2,248,000 tablets
Total annual sales/issues by NMS=2,248,000		

JMS Annual Sales:

- JMS sales consisted of sales of three pack sizes of the same drug.
- Annual consumption was calculated by adding together sales of all three-pack sizes.

Table 9: Sales/Issues by Joint Medical Stores 2001–2002

Pack size	Time Period	Annual Sales/Issues
1,000 tablets/pack	April 2001–April 2002	7,300 packs × 1,000 tablets/pack = 7,300,000 tablets
100 tablets/pack	April 2001–April 2002	700 packs × 100 tablets/pack = 700,000 tablets
Total annual sales/issues by JMS=8,000,000		

Projected annual requirements using sales/issues for 2001/2002 = 10,248,000 tablets.

3.1.3 Adjusted sales/issues based projection for quinine tablets (using 2000 and 2002 sales/issues data)

The following consumption/sales figures were reported for the public sector/NGO on page 72 of the 2000 document:

- Combined annual 2000 sales/issues = 15,953,050 tablets.
- The average of 2000 and 2002 sales/issues = 13,100,000 tablets.

Projected annual requirements using adjusted sales/issues for 2000/2002 = 13,100,000 tablets.

3.1.4 Comparison of projections for quinine tablets

The 2000 and 2002 sales figures were averaged because there was a wide difference between the two. These adjusted sales figures better reflect this expected increase in demand for quinine tablets. Likewise, the adjusted sales figures represent less than 50 percent of the morbidity projection, which is reasonable because it is likely that 50 percent or less of attacks are ever really treated at public and NGO sites.

3.1.5 Final estimate of annual requirements of quinine tablets

The final estimate of the annual requirements of quinine tablets is—

Final projected annual requirements of quinine tablets = 13,100,000 tablets.

3.2 Estimates of Stock Position of Quinine Tablets in April 2002: MOH and NGO Systems

Only the NMS and JMS stock positions were investigated.

Table 10: Stock on Hand and in Pipeline

Stock Position	NMS	JMS
Currently in Stock	1,725 packs × 1,000 tablets = 1,725,000 tablets	3,500 packs × 1,000 tablets = 3,500,000 tablets 2,635 packs × 100 tablets = 263,500 tablets
In the Pipeline		
Total Stock (on hand and pipeline)	1,725,000 tablets	3,763,500 tablets

- Stock on hand and in pipeline of quinine for MOH/NGO systems = 5,488,000 tablets.
- Assuming 13,100,000 tablets annual issues, then months of stock (MOS) in April 2002 = 5.0 MOS.

3.3 Requirements Estimation for Quinine Tablets: MOH and NGO Systems

If 13,100,000 tablets represent the annual consumptionof quinine (1,091,000 tablets per month) and we assume that the lead time for purchase is two months, then the stock on hand at the time of the delivery for the new procurement will be 3.0 MOS. Therefore, to bring the overall stock level up to 12 months of stock, it is necessary to purchase nine MOS.

The quantity to order to attain 12 MOS of quinine = 9.0 MOS × 1,091,000 tablets = 9,819,000 tablets.

4. Quinine Injections

4.1 Estimates of Annual Consumption of Quinine Injections: MOH and NGO Systems

Three estimates of the annual consumption/sales of quinine injections in the MOH and NGO systems were developed and compared.

4.1.1 Morbidity-based projection for quinine injections (adjusted from 2000 document)

This estimate is based on the methodology used by consultants in 2000 to estimate drug needs for the various anti-malarial drugs. The only adjustment made to this methodology was to assume that the new first-line and second-line treatment would go into effect immediately (meaning that quinine injections would be provided in about 5 percent of all attacks when the first-line treatment fails). The methodology assumes the following:

- That new second-line treatment utilizing quinine will take effect immediately in the program.

- On average, the prevalence of symptomatic malaria attacks for an adult 15 years and older is estimated to be two per year, and five percent of these attacks are treated with six ampoules of quinine injection.

- On average, the prevalence of symptomatic malaria attacks for a child between five and 15 years is estimated to be four per year, and five percent of these attacks are treated with three ampoules of quinine injection.

- On average, the prevalence of symptomatic malaria attacks for a child under age five is estimated to be six per year, and 5 percent of these attacks are treated with one and one-half ampoules of quinine injection.

- That quinine will be administered in 5 percent of attacks after the first-line treatment fails.

- Year 2000 population estimates still apply.

- Thirty-eight percent of all attacks are treated by the MOH and NGO sectors.

- Every symptomatic attack is treated.

The requirements are as follows:

1. *Children under five:*
   Number of children ×number of attacks × treatment regime =
   .05 × 4,201,028 × 6 × 1.5 = 1,890,000 ampoules

2. *Children five to 15:*
   Number of children × number of attacks × treatment regime =
   .05 × 6,299,178 × 4 × 3 = 3,779,506 ampoules

3. *Adults:*
   Number of adults × number of attacks × treatment regime =
   .05 × 11,709,794 × 2 × 6 = 7,025,000 ampoules

- Total for children and adults = 12,694,000 ampoules
- Thirty-eight percent of these cases treated MOH/NGO = 4,823,720 ampoules

Projected annual requirements using morbidity projection = 4,823,720 ampuoles.

4.1.2 Sales/issues based projection for quinine injections (using recent sales/issues data)

Sales/issues data provided under this projection were collected from NMS and JMS for the year previous to April 2002. Only NMS and JMS sales were collected because it is assumed that MOH authorities are only concerned with quinine injections supplied through these channels.

NMS Annual Sales:

- Sales NMS (January 2001–March 2002): 611,000 ampoules
- Annual sales: 489,000 ampoules

JMS Sales/Issues:

- Sales JMS (April 2001–March 2002):
- Annual sales: 532,000 ampoules

Projected annual requirements using sales/issues for 2001/2002 = 1,021,000 ampoules.

4.1.3 Adjusted sales/issues based projection for quinine injections (using 2000 and 2002 sales/issues data)

The following consumption/sales figures were reported for the public sector/NGO on page 72 of the 2000 document:

- Combined annual 2000 sales/issues = 2,315,230 ampoules.
- The average of 2000 and 2002 sales/issues = 1,668,000 ampoules.

Projected annual requirements using adjusted sales/issues for 2000/2002 = 1,668,000 ampoules.

4.1.4 Comparison of projections for quinine injections

The 2000 and 2002 sales figures were averaged because there was a wide difference between the two. These adjusted sales figures better reflect the expected increase in demand for quinine injections. Likewise, the adjusted sales figures represent fewer than 50 percent of the morbidity projection, which is reasonable because it is likely that 50 percent or fewer attacks are ever treated at public and NGO sites.

4.1.5 Final estimate of annual requirements of quinine injections

The final estimate of the annual requirements of quinine injections is—

Final projected annual requirements of quinine injections = 1,668,000 ampoules.

4.2 Estimates of Stock Position of Quinine Injections in April 2002: MOH and NGO Systems

Only the NMS and JMS stock positions were investigated.

Table 11: Stock on Hand and in Pipeline

Stock Position	NMS	JMS
Currently in Stock	144,099 ampoules	428,500 ampoules
In the Pipeline		240,000 ampoules
Total Stock (on hand and pipeline)	144,099 ampoules	668,500 ampoules

- Quinine injections stock on hand and in the pipeline for the MOH/NGO systems = 812,000 ampuoles.

- Assuming 1,668,000 ampoules are issued annually, then months of stock (MOS) in April 2002 = 5.8 MOS.

4.3 Requirements Estimation for Quinine Injections: MOH and NGO Systems

If 1,668,000 ampoules represent the annual consumption of quinine injections (139,000 ampoules per month), and we assume that the lead time for purchase is two months, then the stock on hand at the time of delivery for the new procurement will be 3.8 MOS. Therefore, to bring the overall stock level up to 12 months of stock, it is necessary to purchase 8.2 MOS.

- The quantity to order to attain 12 MOS of quinine = 8.2 MOS × 139,000 ampoules = 1,139,800 ampoules.

5. Quantities Required for Malaria Treatment

Table 12: Quantities Required for Treatment of Malaria in the Public and NGO Sectors

Drug Name, Dosage, form	Annual Amount Required	Stock on Hand/Quantity on Order	Quantity to Order
SP 500 mg/25 mg tablets	26,985,000	7,280,000 (3.2 MOS)	24,280,000
CQ 150 mg tablets	62,092,000	19,698,000 (3.7 MOS)	53,292,000
Quinine 300 mg tablets	13,100,000	5,488,000 (5 MOS)	9,819,000
Quinine 300 mg/ml 2ml amp	1,668,000	812,000 (5.8 MOS)	1,139,800

Recommendations

The following sectons are a combination of short-term and medium term recommendations to ensure that time-sensitive actions and long-term strategic approaches with significant implications for commodity availability and logistics functions can be taken and/or begun. It is expected that the recommendations will be implemented by the combination of representatives from the malaria, STD/ACP, and TB program within the MOH, as well as all relevant partners working in each programmatic area.

1. General Recommendations

Recommendation 1 (mid-term to long-term). Continue advocating for the urgent need to recruit a senior logistics officer to work within the expanded pharmacy department. Although the DELIVER resident advisor will continue to work with the pharmacy department team in implementing logistics system improvement activities, it is important that the team include logistics management skills so capacity building within the MOH in the area of supply chain management is possible.

Recommendation 2 (mid-term). Explore the possibility of developing an action plan between all the units in the MOH and NMS to concretely identify the timeframe for integrating selected logistics management functions and obtain commitments to move the plan forward.

Recommendation 3 (short-term). Identify possible study tours for NMS and other appropriate commodity managers to visit neighbouring countries and benefit from lessons learned in integration, decentralization, and reform of the NMSs.

Recommendation 4 (mid-term). Expedite the development and maintenance of a central commodity database to track all MOH and donor inputs for essential health commodity supplies. This information has been crucial in alerting commodity management donors and stakeholders about impending stockouts or shortages in various product categories, and this is likely to continue.

Recommendation 5 (mid-term). Expedite the development and maintenance of a logistics management information system to ensure that accurate stock balances, issues, and receipts are recorded at all warehouses and service delivery points, and that this information is routinely transmitted to a central database where it can be processed.

2. Malaria Program Recommendations

2.1 Quantification

Recommendation 6 (short-term to mid-term). After HOMAPAK (one full course of SP and CQ to treat malaria) is introduced in eight districts, assess its impact on the MOH and NGO systems and future quantifications. It is currently assumed that impact will be minimal because of the inadequate budget to support this new community-based program.

2.2 Procurement and Financing

Recommendation 7 (short-term). Ensure that DFID and Irish AID-financed emergency one-year supply of SP and quinine arrives as soon as possible.

Recommendation 8 (short-term to mid-term). Initiate procurement of amounts quantified in table 5, as soon as possible.

Recommendation 9 (mid-term to long-term). Begin to identify possible funding sources for 2003 and approach each source in mid-2002 after the next quantification exercise is complete.

2.3 Distribution and Storage

Recommendation 10 (short-term to mid-term). Ensure that all MOH (and especially NGO) clinics are aware of new standard treatment guidelines (calling for use of SP and CQ as first-line treatment, quinine tablets for second-line treatment, and quinine injection for complicated cases).

Recommendation 11 (short-term to mid-term). Consider streamlining the process used by HCs to order anti-malarial drugs from districts (e.g., one possibility is to have districts collect orders of HCs, consolidate the orders, and make one purchase. This may be the most cost effective and is already in use within the system, in some places. Alternatively, explore the inclusion of anti-malarial drugs and financing mechanism in the MOH/Pharmacy and HSSP push-pull transition, which assists districts in quantifying their own needs.

Recommendation 12 (short-term to mid-term). Consider integrating anti-malarial drugs within the essential drug supply system.

Appendix A

People Contacted

People Contacted

Name	Organization	Telephone
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